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3,165,348

HANDLING DEVICE FOR CYLINDRICAL OR LIKE OBJECTS

Filed Sept. 3, 1963

2 Sheets-Sheet 1

FIG. 1.

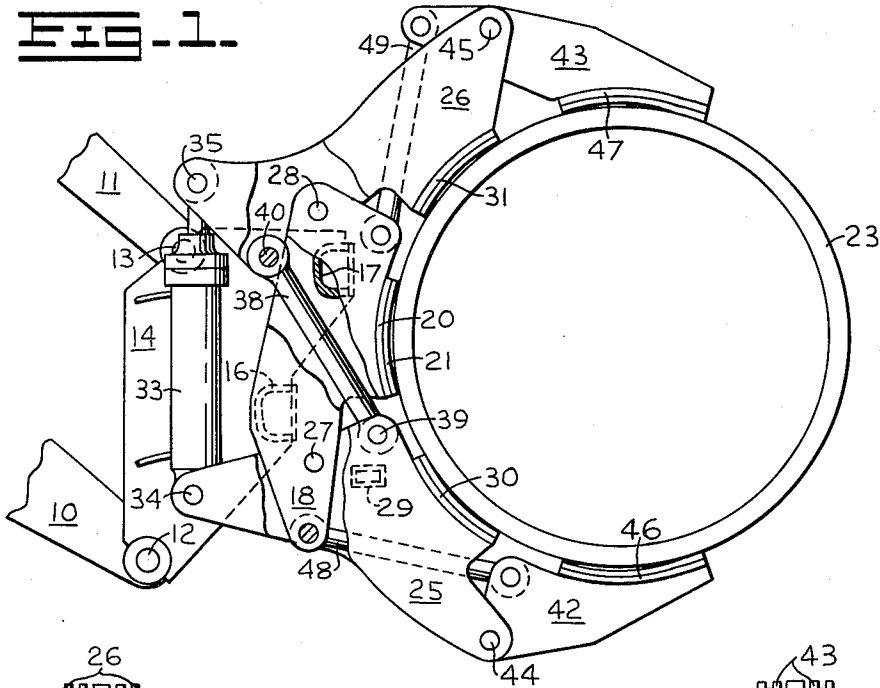
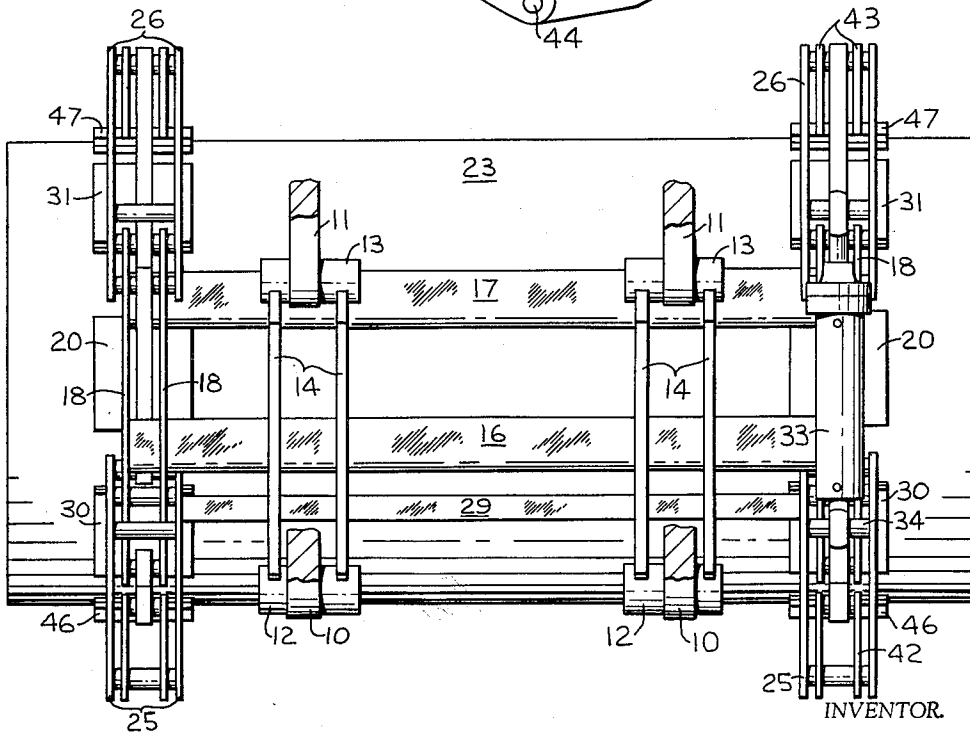


FIG. 2.

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FIG. 3.

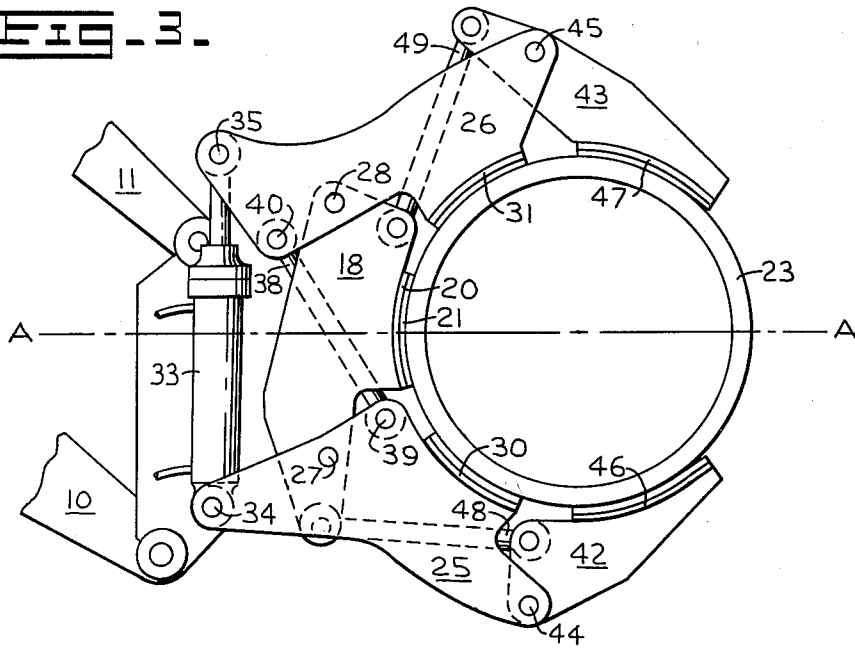
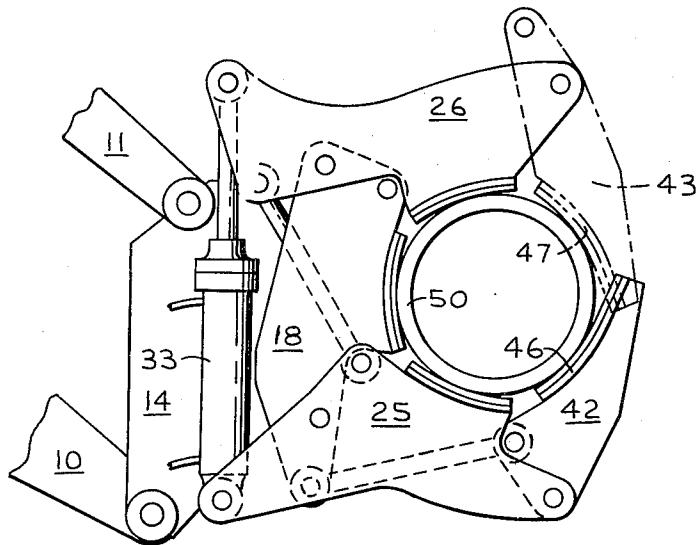


FIG. 4.

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HANDLING DEVICE FOR CYLINDRICAL OR LIKE OBJECTS

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4 Claims. (Cl. 294—88)

This invention relates to handling or so-called grappling devices for grasping and moving cylindrical or approximately cylindrical articles such as pipe, logs, barrels and the like.

Many articles, and particularly large pipes, are wrapped or coated, sometimes with a soft felt or paper subject to abrasion and tearing, and sometimes with cement or other friable material subject to chipping and cracking.

It is the object of the present invention to provide a grappling device in which several arms or levers carry shoes that can be brought into engagement with a cylindrical article at various points about its periphery by movement in a direction which is substantially radial and inward with respect to the article so as firmly to embrace it for transportation with a minimum of scraping or abrading contact. It is also an object of the present invention to provide a relatively simple device of the kind described capable of handling articles through a wide range of sizes. Further and more specific objects and advantages of the invention are made apparent in the following specification by reference to the accompanying drawings.

The invention is disclosed herein as used with a tractor-mounted bucket loader type of machine in which it replaces the usual bucket. It will also be described as mounted for use on horizontally disposed articles such as pipe or logs resting on the ground. However, as the description proceeds it will become evident that the device of the invention can be mounted on other types of machines and disposed in various attitudes such, for example, as required for handling vertical cylindrical forms like barrels or drums standing on end.

In the drawings:

FIG. 1 is a view in side elevation with parts in section and parts broken away of a grappling device embodying the present invention and illustrated as holding a pipe of large diameter;

FIG. 2 is a view in rear elevation of the device shown in FIG. 1 with one of a pair of actuating jacks removed;

FIG. 3 is an elevation similar to FIG. 1 showing the device holding a pipe of smaller diameter; and

FIG. 4 is a similar elevation illustrating the adaptability of the device to pipes of very much smaller diameter.

Referring to FIGS. 1 and 2 the device of the present invention is shown as mounted on the forward ends of the bucket mounting apparatus of a conventional bucket type loader. Such loaders comprise a pair of lift arms the forward ends of which are illustrated at 10 and a pair of tilt linkages the forward ends of which are illustrated at 11. These are connected as by pivots 12 and 13, respectively, with frames comprising plates 14 which may be raised and lowered by the lift arms and rocketed forwardly and rearwardly about the lift arm pivots 12 by means of the tilt linkage, all in a well-known manner. Cross beams 16 and 17 extend between and beyond the frames 14, as best shown in FIG. 2, and support spaced frames 18 adjacent their outer ends, clearly shown at the left side of FIG. 2 but concealed by a hydraulic jack at the right side. These frames 18 carry shoes 20, preferably padded with rubber or other protective material as shown at 21, for engagement with the surface of a cylindrical article, in this case a pipe 23, at a plane which intersects the axis of the pipe at a point substantially midway between the top and bottom of the frames 18, such a plane being illustrated at A in FIG. 3 of the drawings.

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Two levers 25 and 26, the configuration of which is most clearly illustrated in FIG. 3, are pivoted with respect to the lower and upper portions of the frame 18 as at 27 and 28 respectively. Each of these levers carries a shoe 30 and 31 adjacent its forward end, also lined with a soft material in the manner of the shoe 20. They may also be strengthened by an interconnecting cross beam as shown at 29. At their opposite or rearward ends the levers 25 and 26 are connected by a double-acting hydraulic jack 33, the cylinder of which is pivoted to the lever 25 as at 34 and the rod of which is pivoted to the lever 26 as at 35, only one of these jacks being shown in FIG. 2. These jacks can be extended and retracted by hydraulic fluid under pressure from a suitable source and with suitable controls at the operator station of the tractor upon which the device is mounted, all in a conventional and well-known manner. Extension of the jacks moves the outer ends of the levers 25 and 26 away from each other swinging the inner ends with the shoes 30 and 31 thereon inwardly with respect to the pipe 23 on arcs which are disposed in a generally radial position with respect to the pipe so that they move into contact with the pipe with a minimum of rubbing or abrading effect. The levers 25 and 26 are constrained to move simultaneously and equally by a link 38 extending between them and pivotally connected to them as at 39 and 40.

Each of the levers 25 and 26 carries a forwardly extending lever 42 and 43, respectively, pivotally supported as at 44 and 45. These levers 42 and 43 with article engaging shoes 46 and 47 thereon are automatically swung inwardly upon inward movement of their supporting levers 25 and 26 by means of links connecting them with the relatively stationary frames 18, such links being illustrated at 48 and 49. Consequently the single jack 33 for each frame and set of levers is operable when the shoe 20 is engaged with the pipe to swing all four levers inwardly until their shoes engage and clamp the pipe through a large portion of its circumference as illustrated, and the damaging of the surface of the pipe is greatly minimized by the direction of movement of the shoes as they contact it.

FIGS. 1 and 3 illustrate the pipe supported forwardly of the lift and tilt linkage of the tractor but since this linkage is operable, to tilt the frames 14 and thus the frames 18 forwardly, a pipe disposed on the ground may be approached from above to be engaged adjacent its top by the shoes 20 and the four sets of movable levers may then be actuated to move inwardly for engagement with the sides of the pipe, making it unnecessary to force any part of the grappling device between the pipe and the ground which would result in damaging of fragile coatings or wrappings on the pipe.

The device of the present invention is capable of handling pipes through a large range of sizes, for example, from 21 inches to 50 inches in diameter. The shoes which engage the pipe are preferably curved or contoured to mate perfectly with a pipe of intermediate size, say 32 inches, such a pipe being illustrated in FIG. 3, while the same shoes are illustrated in FIG. 1 as they would appear in an engagement with a pipe of 42 inch

The device may be readily adapted to handling articles smaller than those of its nominal range as illustrated in FIG. 4 wherein the lever 43, the normal position of which is illustrated in broken lines, has been removed together with its actuating link 49. This prevents interference between the lever 43 and the operating lever 42 and still provides gripping contact with a pipe as shown at 50, which is only 18 inches in diameter, throughout a great portion of its peripheral surface. It is also possible to offset or provide spaces for interlocking or overlapping the ends of the shoes 46 and 47 so that the lever 43 may

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remain in place during the handling of an article of small diameter.

I claim:

1. A grappling device for handling cylindrical or the like articles comprising a relatively stationary frame with an article engaging shoe thereon, levers pivoted to said frame at opposite sides of said shoe, second levers pivoted one to each of said first named levers, an article engaging shoe on each of said first and second levers, power actuated extensible means between the first levers to swing them inwardly toward an article, and linkage connecting the second levers with said frame to effect inward swinging of the second levers upon inward swinging of the first levers.

2. The device of claim 1 in which all levers are in pairs spaced to engage a cylindrical article at longitudinally spaced points.

3. The device of claim 1 in which the levers and shoes

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are disposed for movement in a direction generally radially with respect to a cylindrical article to be engaged by the shoes.

4. The device of claim 1 with supporting means, means to raise and lower the supporting means, and means mounting the supporting means for forward and rearward tilting movement whereby an article to be grasped may be approached from one side or alternately from above.

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